



We help ideas meet the real world

DELTA Test Report



TEST Reg. no. 19

Test of USB Meter Reader according to FCC requirements

Performed for Kamstrup A/S

DANAK-19/12505 Rev. A

Project no.: T203210-3

Page 1 of 41

30 October 2012

DELTA

Venlighedsvej 4
2970 Hørsholm
Denmark

Tlf. +45 72 19 40 00

Fax +45 72 19 40 01

www.delta.dk

VAT No. 12275110

Title Test of USB Meter Reader according to FCC requirements

Test object USB Meter Reader

Report no. DANAK-19/12505 Rev. A

Project no. T203210-3

Test period 04 September to 02 October 2012

Client Kamstrup A/S
Industrivej 28, Stilling
8660 Skanderborg
Denmark
Tel.: +45 89 93 10 00

Contact person Bjarne Lund Jensen
E-mail: blj@kamstrup.dk

Manufacturer Kamstrup A/S

Specifications 47 CFR Part 15, Subpart B, Class B
47 CFR Part 15, Subpart C (Specific rule part §15.247)

Results The test objects were found to be in compliance with the specifications, as listed in Section 1

Test personnel Claus Momme Thomsen

Test site(s) DELTA, Venlighedsvej 4, 2970 Hørsholm, Denmark

Date 30 October 2012

Project Manager



Jakob Steensen, Consultant
Centre of Compliance Engineering, DELTA

Responsible



Claus Rømer Andersen, Business Manager
Centre of Compliance Engineering, DELTA

This test report replaces previously issued test report DANAK-19/12505 dated 22 October 2012. The changes in this report are:

Section 6: Information about calibration has been added.



	Table of contents	Page
1.	Summary of tests	5
2.	Test object and auxiliary equipment	6
2.1	Test objects	7
2.2	Auxiliary equipment	9
3.	General test conditions	10
3.1	Test setup during test	10
3.1.1	Description and intended use of test object	11
3.1.2	Test modes during emission tests	11
3.2	Radio specification	12
4.	Test results	13
4.1	Test ID 2.4a: Conducted emission, AC Mains	13
4.2	Test ID 2.4b: Conducted emission, AC Mains	16
4.3	Test ID 2.5a: Radiated limits below 1 GHz	19
4.4	Test ID 2.5a: Radiated limits above 1 GHz	22
4.5	Test ID 2.5b: Radiated limits below 1 GHz	25
4.6	Test ID 2.5b: Radiated limits above 1 GHz	28
4.7	Test ID 2.6: Antenna conducted emission	31
4.8	Test ID 2.3: 6 dB bandwidth	33
4.9	Test ID 2.7: Occupied bandwidth & band edge compliance	35
4.10	Test ID 2.8: Power Spectral Density	37
5.	National registrations and accreditations	40
5.1	DANAK Accreditation	40
5.2	FCC Registrations	40
5.3	VCCI Registrations	40
5.4	IC Registrations	40
6.	List of instruments	41

1. Summary of tests

The authorization procedures for the USB Meter Reader are:

Declaration of Conformity by FCC Part 15 B, Class B (residential use).

Certification by FCC Part 15 C.

Test case ID	Description	Specification	Test methods	Results
2.3	6 dB Bandwidth	47 CFR Part 15C Subpart 15.247(a)(2)	ANSI C63.10-2009	Passed
2.4	Conducted limits	47 CFR Part 15B Subpart 15.107	ANSI C63.10-2009	Passed
2.4	Conducted limits	47 CFR Part 15C Subpart 15.207	ANSI C63.10-2009	Passed
2.5	Radiated limits	47 CFR Part 15B Subpart 15.109	ANSI C63.10-2009	Passed
2.5	Radiated limits; general requirements	47 CFR Part 15C Subpart 15.209	ANSI C63.10-2009	Passed
2.6	Antenna Conducted Emission	47 CFR Part 15C Subpart 15.247(b)(3)	ANSI C63.10-2009	Passed
2.7	Occupied Bandwidth & Band Edge Compliance	47 CFR Part 15C Subpart 15.247(c)	ANSI C63.10-2009	Passed
2.8	Power Spectral Density	47 CFR Part 15C Subpart 15.247(e)	ANSI C63.10-2009	Passed

The given result is based on a shared risk principle with respect to the measurement uncertainty.

Conclusion

The test objects mentioned in this report meet the requirements of the rule parts stated below.

- 47 CFR Part 15, Subpart B, Class B
- 47 CFR Part 15, Subpart C (Specific rule part §15.247).

The test results relate only to the objects tested.



2. Test object and auxiliary equipment



Photo 2.1.1 Front and back of the test object.



Photo 2.1.2 Antenna option “stubby” used with the test object in one out of two possible configurations.



Photo 2.1.3 Antenna option “roof” used with the test object in one out of two possible configurations.

2.1 Test objects

Test object 2.1.1

Name of test object	USB Meter Reader
Model / type	USB Meter Reader
Part no.	-
Serial no.	SN:31248
FCC ID	OUY-USBEXT
Manufacturer	Kamstrup A/S
Supply voltage	5.0 VDC (USB only)
Software version	Test software ver 001
Hardware version	-
Cycle time	0.1 msec
Highest frequency generated or used	916.0 MHz
Comment	Used for radiated and conducted measurements

Test object (antenna) 2.1.2

Name of test object	Procell Stubby antenna
Model / type	Unique connector (i.e. reverse polarity SMA)
Part no.	SBC-01
Serial no.	-
FCC ID	-
Manufacturer	Procell
Supply voltage	-
Software version	-
Hardware version	-
Cycle time	-
Maximum gain	0 dBi
Comment	This is one out of the full set of two different, optional antennas, which may be used with the USB Meter Reader.



Test object (antenna) 2.1.3

Name of test object	Customized version of Smarteq MidiMag magnet mount antenna base with a 3.6 meter RG174 cable
Model / type	Unique connector (i.e. reverse polarity SMA)
Part no.	Smarteq RA 3146.03, product number 3146.03.00.00, 872-960 MHz whip glued with permant glue (loctide) to the Smarteq MidiMag base on the FME connector
Serial no.	-
FCC ID	-
Manufacturer	Smarteq / Kamstrup A/S
Supply voltage	-
Software version	-
Hardware version	-
Cycle time	-
Maximum gain	5.15 dBi
Comment	This is one out of the full set of two different, optional antennas which may be used with the USB Meter Reader.

2.2 Auxiliary equipment

Auxiliary equipment 2.2.1

Name of auxiliary equipment	IBM PC Thinkpad T61
Model / type	7659-12G
Part no.	-
Serial no.	L3-E6525 07/09
FCC ID	-
Manufacturer	Lenovo
Supply voltage	20 VDC
Highest frequency generated or used	-
Comment	During testing, all wireless functions are turned off.

Auxiliary equipment 2.2.2

Name of auxiliary equipment	AC/DC power supply for IBM PC
Model / type	“AC Adapter 90W 20V”
Part no.	11S42T5292Z1ZGE60629DM REV.3
Serial no.	081150-11
FCC ID	-
Manufacturer	Lenovo
Supply voltage	115 VAC
Highest frequency generated or used	-
Comment	-



3. General test conditions

3.1 Test setup during test

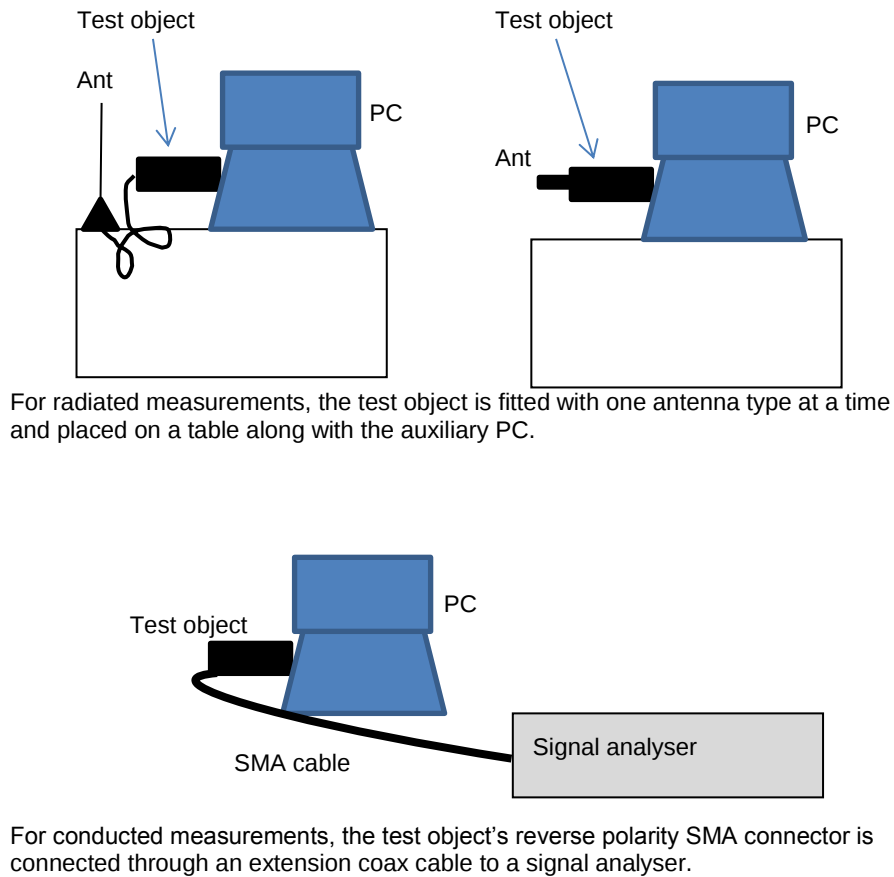


Figure 3.1 Block diagram of test objects with cables and auxiliary equipment.

The USB Meter Reader is powered by the PC USB port and put into continuous Tx mode. The test object and the PC with power supply are measured as a system. All AC mains conducted emission tests are performed on the AC mains port of the PC power supply.

3.1.1 Description and intended use of test object

The USB Meter Reader is used for retrieving measurement data from Kamstrup wireless water flow meters and similar Kamstrup products. The USB Meter Reader is used in households as well as in industrial and commercial buildings.

The USB Meter Reader is power supplied solely by the USB port of the auxiliary PC or a battery pack, to which it is connected during use.

All measurements, references, readings, events and calculations are stored in a data logger for billing and analysis.

The remote data communication is handled in either of two ways:

- By broadband wireless communication in the 902-928 MHz band with output power of approximately 0.2 mW.
- By standard USB communication to a PC.

The USB Meter Reader has a reverse polarity SMA antenna connector, intended to be connected to one of the two possible antenna types described in Section 2. Both antennas were tested.

3.1.2 Test modes during emission tests

All test objects were running special test software.

Tests were performed at the following fundamental frequency of the radio transmitter: 916.0 MHz.

For all the emission tests, all relevant functions are activated in order to maximize emissions and to monitor that the radio is active. The presence of an active radio is checked both prior to and after each test.

The test object is put into constant, modulated Tx operating mode with a modulation cycle no higher than 0.1 msec, so that each measurement sample completely covers a cycle.



3.2 Radio specification

Radio	Proprietary 916 MHz radio
Fundamental operating frequency (f _c center)	916.0 MHz
Maximum measured field strength @ 3m	90.0 dBuV/m
Antenna type	External antenna (2 types)
Equipment Type	I: Transfer of messages (digital or analogue signals)
Equipment intended for fixed use?	No
Equipment intended for vehicular or mobile use?	Yes
Equipment intended for portable use? (<20cm from user)	Yes
Transmit mode available	Yes
Receive mode available	Yes
Environment	General population
User proximity by FCC definition	Portable and Mobile use (may be less than 20 cm from user during normal operation)
Frequency band	902-928 MHz
Maximum permissible output power in the band	1 W from ant connector (127.38 dBuV/m @ 3m)
Number of power levels	1
Number of channels	1
Modulation forms	FSK (digital modulation)
Maximum Data Rate [kbps]	250
Manufacturer stated band width (20 dB) [kHz]	1000
Manufacturer stated band width (6 dB) [kHz]	520
Channel spacing	One channel only
Maximum Duty Cycle during normal use	1 %



4. Test results

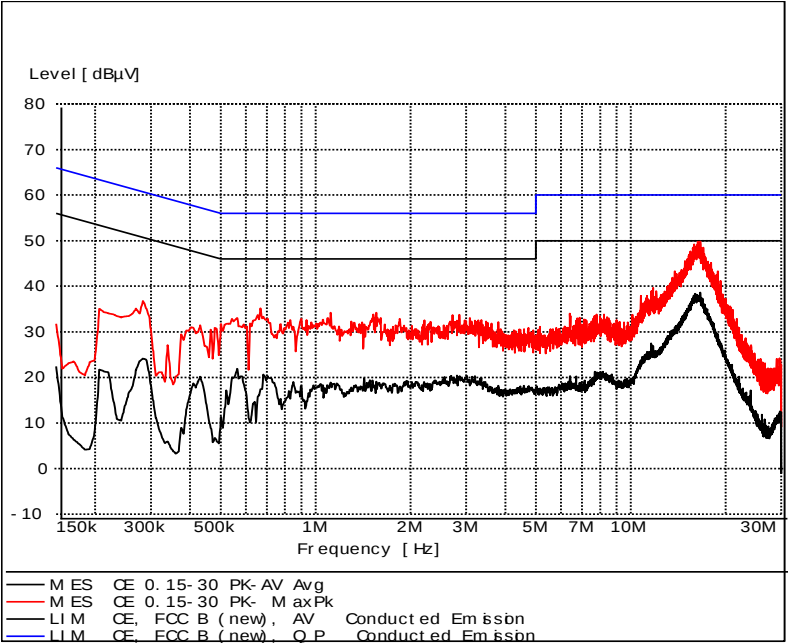
4.1 Test ID 2.4a: Conducted limits, AC Mains

Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.2: Procell Stubby antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	CE-1
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep. 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	0.15-30 MHz

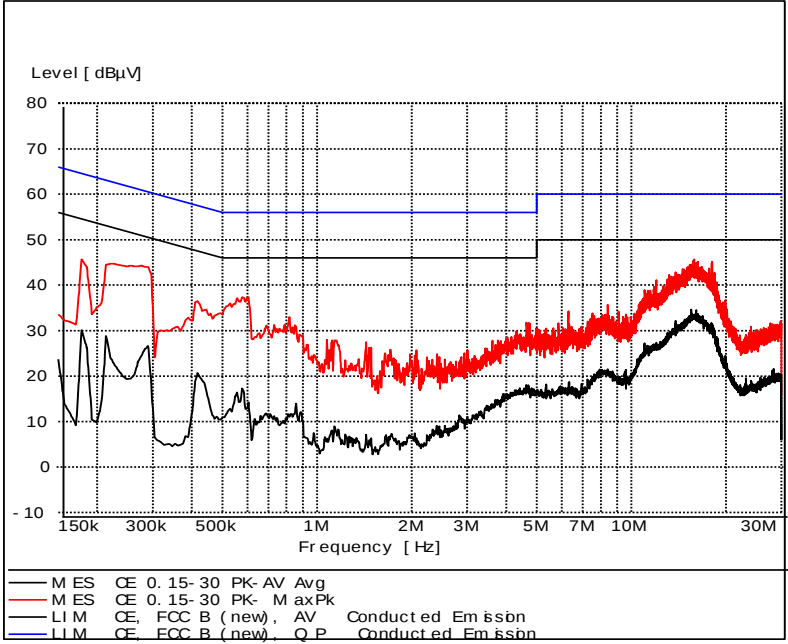
Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Artificial mains network: 50 Ω, 50 μH	Humidity	62 % RH
Detector	Peak and average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29301 29680	Uncertainty	1.7 dB

Line under test	Line & Neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Conducted limits are performed on the AC mains of the auxiliary equipment (IBM PC). AC Mains voltage: 115 VAC.





Line



Neutral





Photo 4.1.1 Test setup regarding measurement of radio conducted limits, AC Mains.



Photo 4.1.2 Test setup regarding measurement of conducted limits, AC Mains.

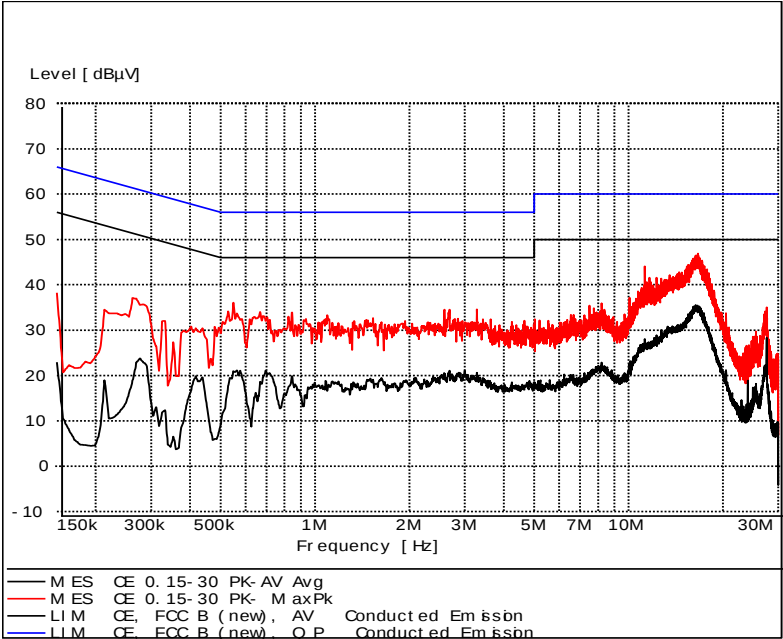


4.2 Test ID 2.4b: Conducted limits, AC Mains

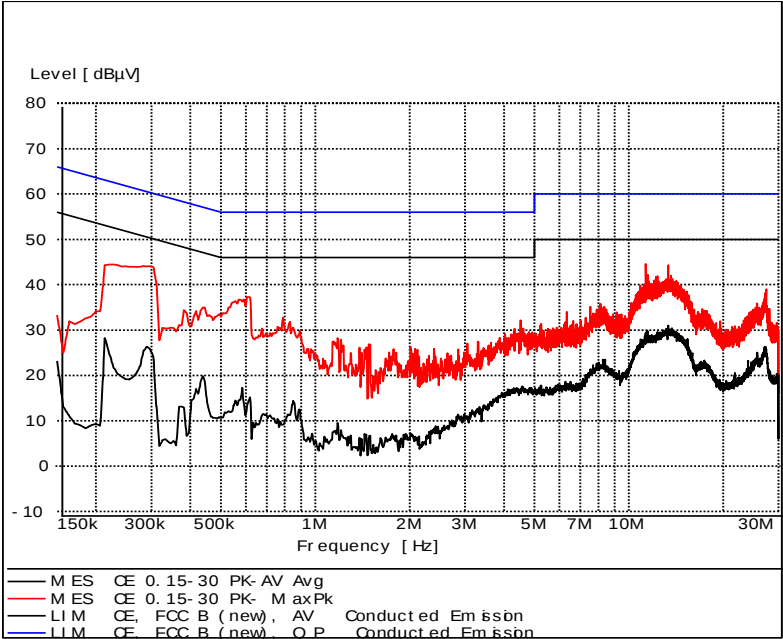
Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.3: Roof antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	CE-2
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep. 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	0.15-30 MHz

Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Artificial mains network: 50 Ω , 50 μ H	Humidity	62 % RH
Detector	Peak and average	Bandwidth	10 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29301 29680	Uncertainty	1.7 dB

Line under test	Line & Neutral
Test result	The measured voltages were below the limit
Compliant	Yes
Comments	Conducted limits are performed on the AC mains of the auxiliary equipment (IBM PC). AC Mains voltage: 115 VAC.



Line



Neutral





Photo 4.2.1 Test setup regarding measurement of radio conducted limits, AC Mains.



Photo 4.2.2 Test setup regarding measurement of conducted limits, AC Mains.



4.3 Test ID 2.5a: Radiated limits below 1 GHz

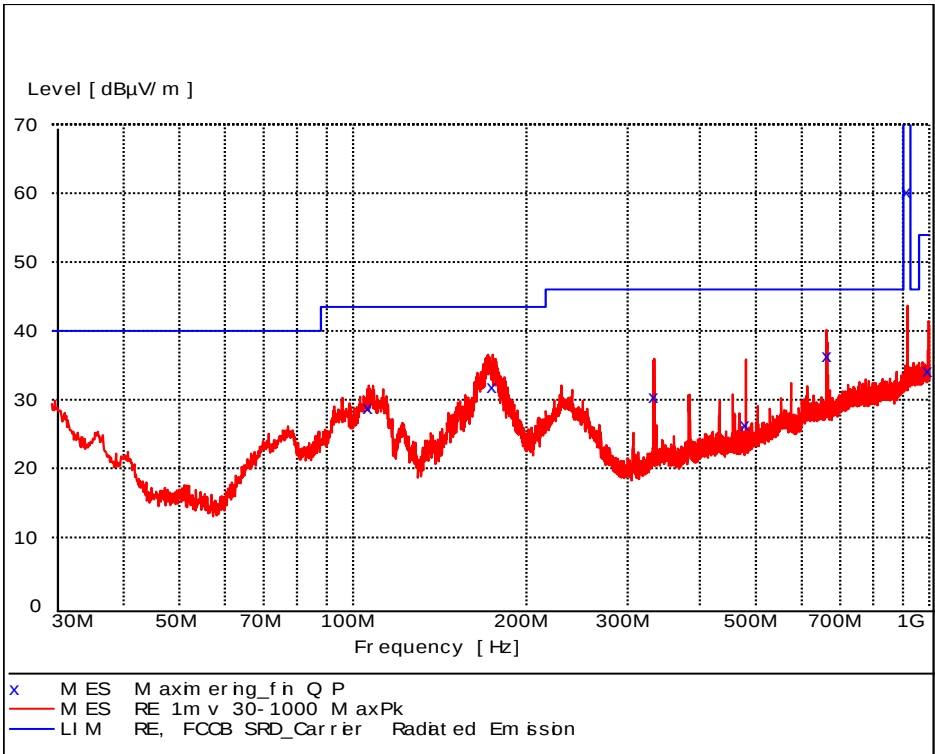
Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.2: Procell Stubby antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	RE_Spur-1
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	30-1000 MHz

Test method	ANSI C63.10:2009			Temperature	22 °C			
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.			Humidity	62 % RH			
Detector	Peak and Quasi peak			Bandwidth	120 kHz			
Test equipm.	EMI room Hørsholm	49600	29861	29727	29301	49421	Uncertainty	4.9 dB

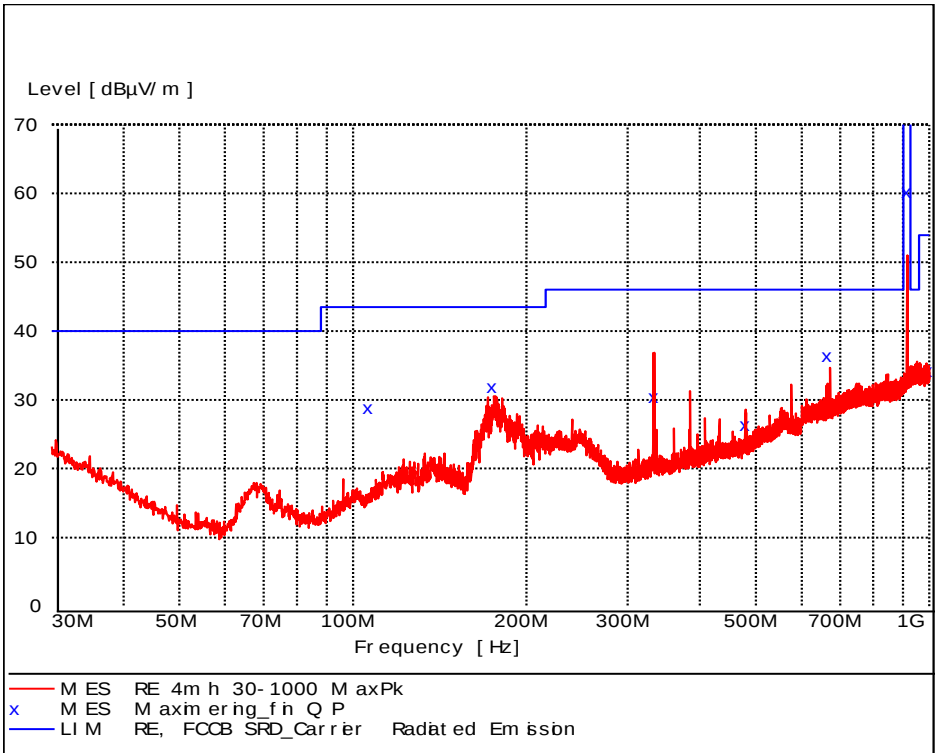
Final max (Quasi peak):							
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
106.500000	28.80	13.4	43.5	14.7	101.0	259.00	VERTICAL
174.700000	31.80	12.7	43.5	11.7	104.0	320.00	VERTICAL
333.000000	30.40	17.4	46.0	15.6	101.0	172.00	HORIZONTAL
480.400000	26.30	20.8	46.0	19.7	172.0	19.00	HORIZONTAL
666.100000	36.30	24.3	46.0	9.7	158.0	352.00	VERTICAL
915.780000	60.20	28.6	127.4	67.2	101.0	65.00	HORIZONTAL
995.700000	34.20	29.4	53.9	19.7	101.0	350.00	VERTICAL

Test result	The measured field strengths were below the limit.
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation





Pre-scan, Antenna at 3 m, 1 m height, vert. pol. Peak detector.



Pre-scan, Antenna at 3 m, 4 m height, hor. pol. Peak detector.



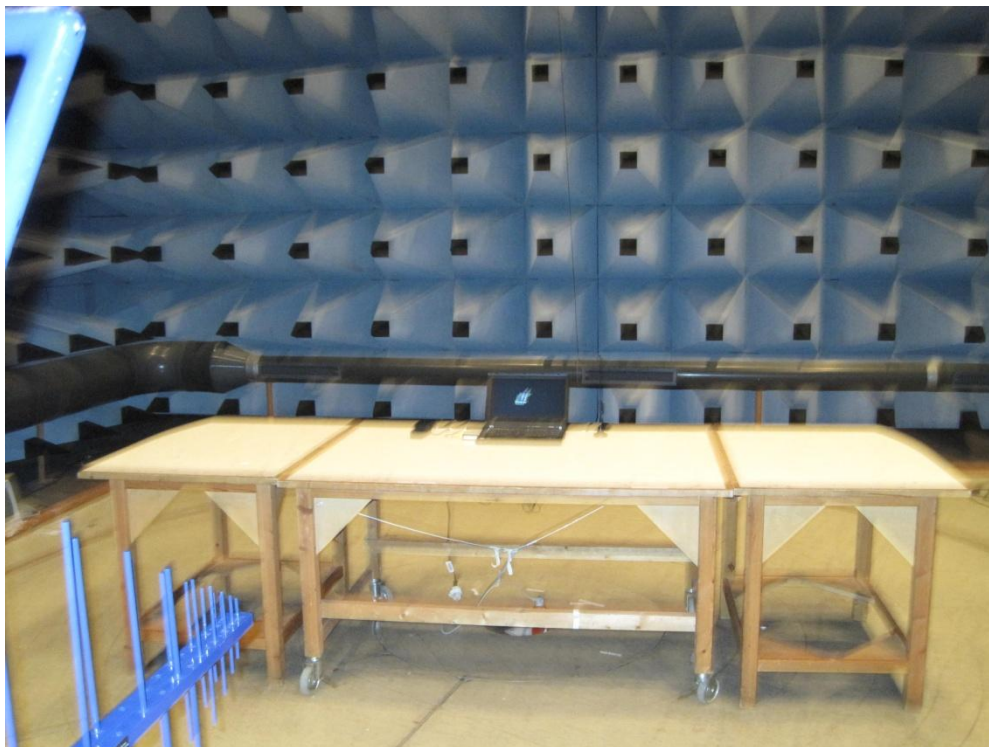


Photo 4.3.1 Test setup regarding measurement radiated limits below 1 GHz.



Photo 4.3.2 Test setup regarding measurement radiated limits below 1 GHz.



4.4 Test ID 2.5a: Radiated limits above 1 GHz

Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.2: Procell Stubby antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	RE_Spur-2
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	1-12.75 GHz

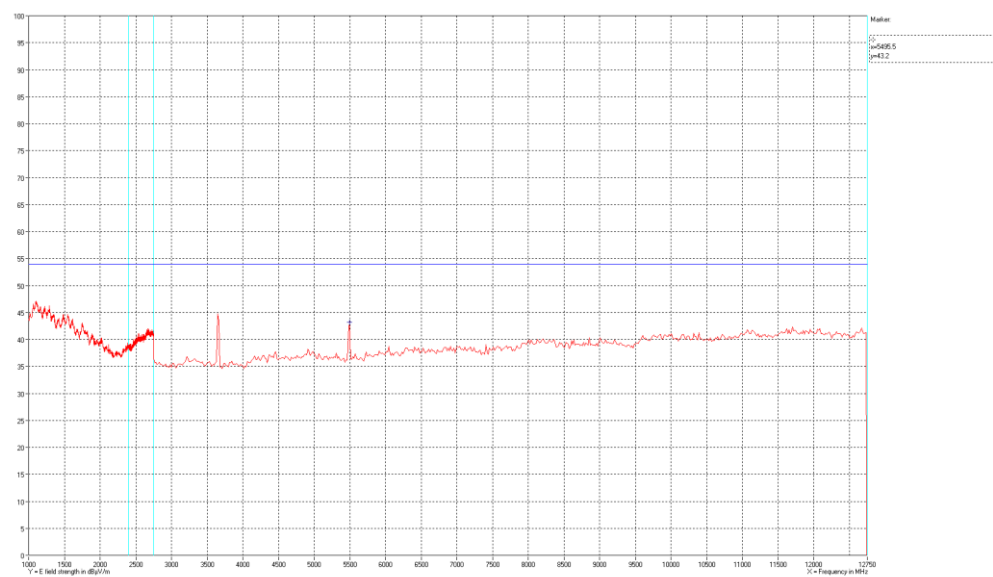
Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	41 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49712 49625	Uncertainty	4.9 dB

Final max (Peak) :

Frequency MHz	Level dBµV/m	Peak Limit dBµV/m	AV Limit dBµV/m	Margin to AV dB	Polarisation
3651.40000	44.5	74.0	54.0	9.5	Complete search
5495.50000	43.2	74.0	54.0	10.8	Complete search

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	Tx @ 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization





Polarization

Vertical and horizontal peak measurements

Comments

All measurements are performed with a peak detector,
all peak measurements are below average limit.



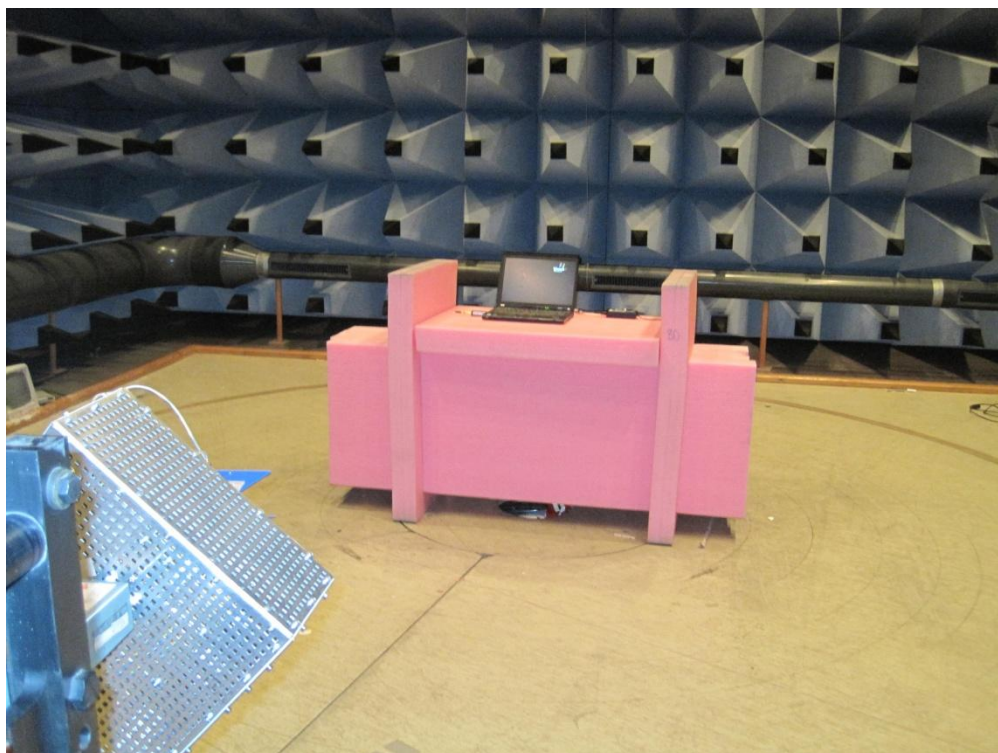


Photo 4.4.1 Test setup regarding measurement radiated limits above 1 GHz.

4.5 Test ID 2.5b: Radiated limits below 1 GHz

Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.2: Roof antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	RE_Spur-3
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	30-1000 MHz

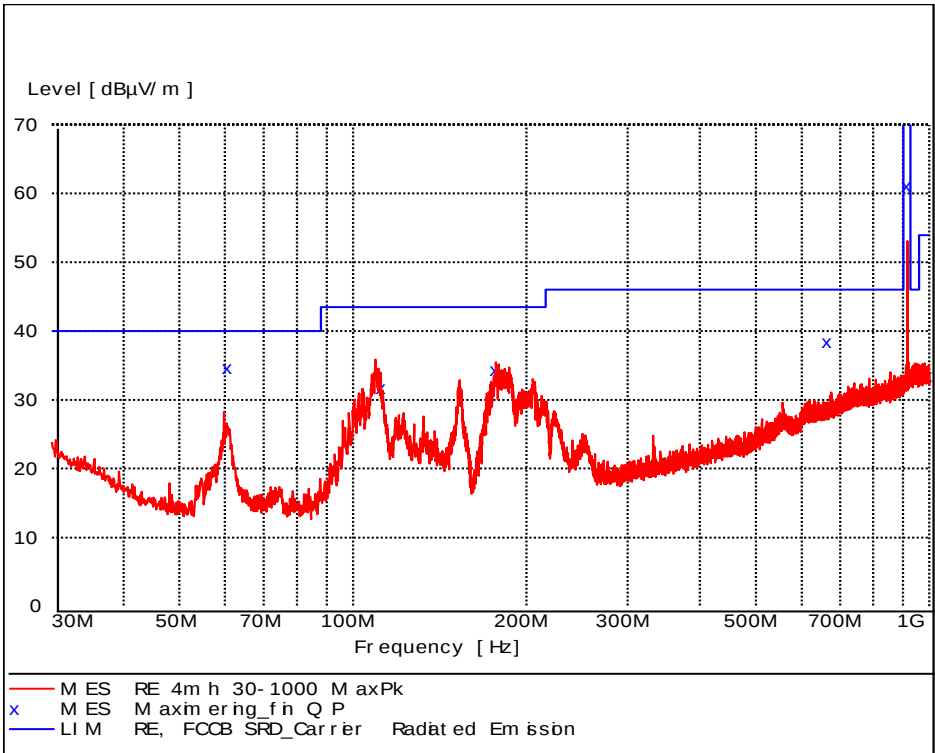
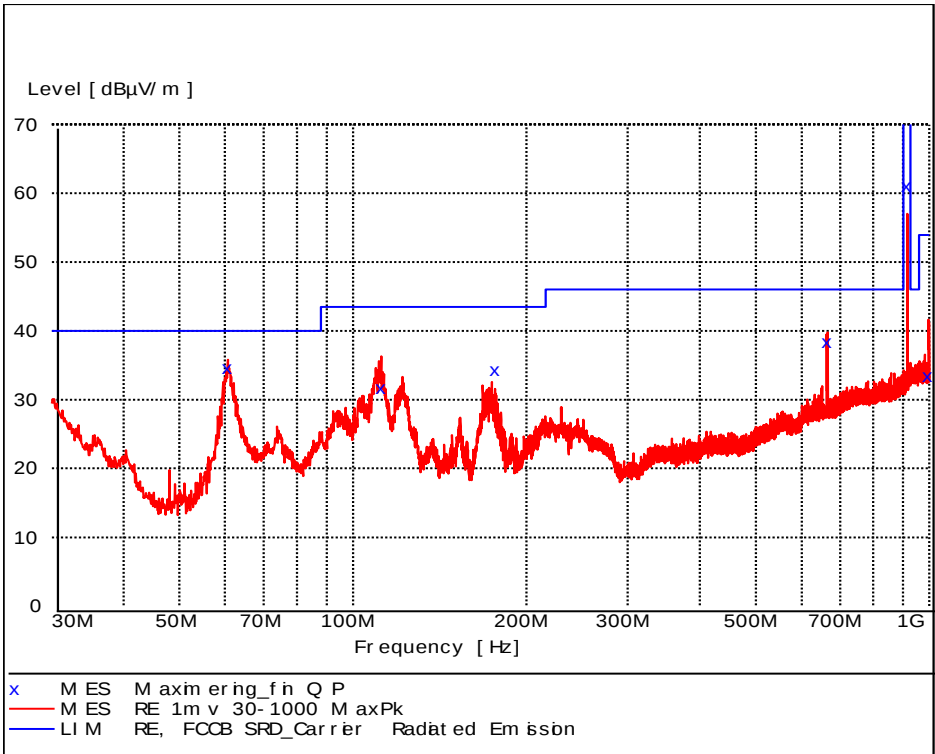
Test method	ANSI C63.10:2009	Temperature	22 °C
Characteristics	Peak search ant. at 3 m, height: 1-4 m, v/h pol.	Humidity	62 % RH
Detector	Peak and Quasi peak	Bandwidth	120 kHz
Test equipm.	EMI room Hørsholm 49600 29861 29727 29301 49421	Uncertainty	4.9 dB

Final max (Quasi peak) :

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
60.600000	34.60	7.6	40.0	5.4	136.0	252.00	VERTICAL
112.000000	31.70	13.7	43.5	11.8	107.0	271.00	VERTICAL
177.000000	34.30	12.6	43.5	9.2	187.0	58.00	HORIZONTAL
666.100000	38.40	24.3	46.0	7.6	157.0	1.00	VERTICAL
915.780000	61.10	28.6	127.4	66.2	117.0	1.00	VERTICAL
995.800000	33.50	29.4	53.9	20.4	108.0	354.00	VERTICAL

Test result	The measured field strengths were below the limit.
Polarization	Vertical and horizontal
Test Port	Enclosure
Test frequency	Tx @ 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height, and antenna polarisation





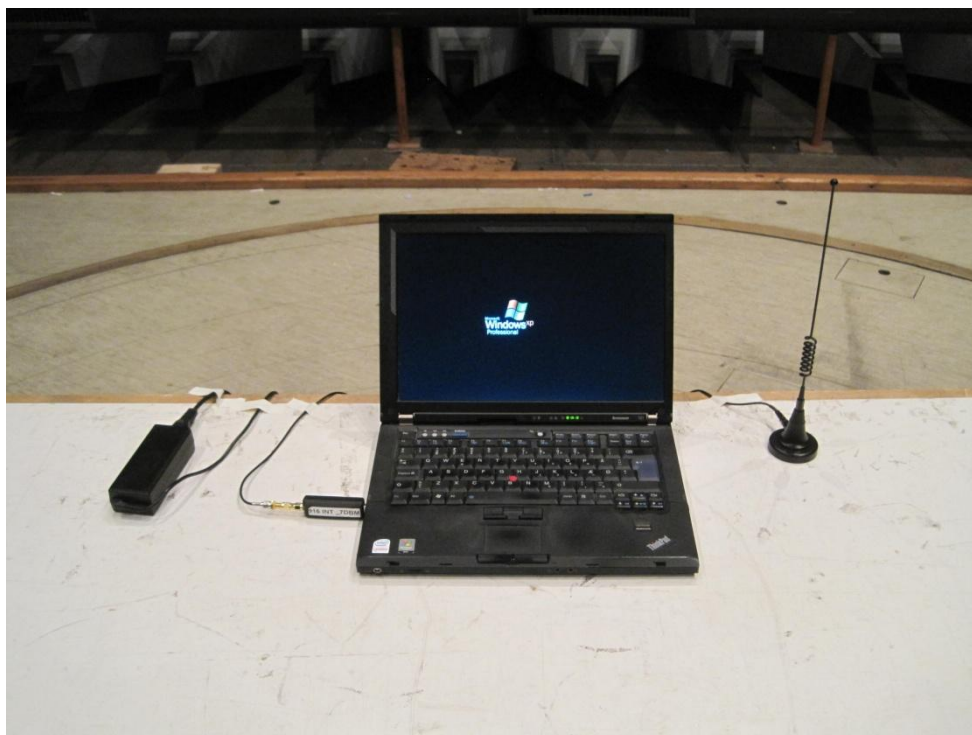


Photo 4.5.1 Test setup regarding measurement radiated limits below 1 GHz.

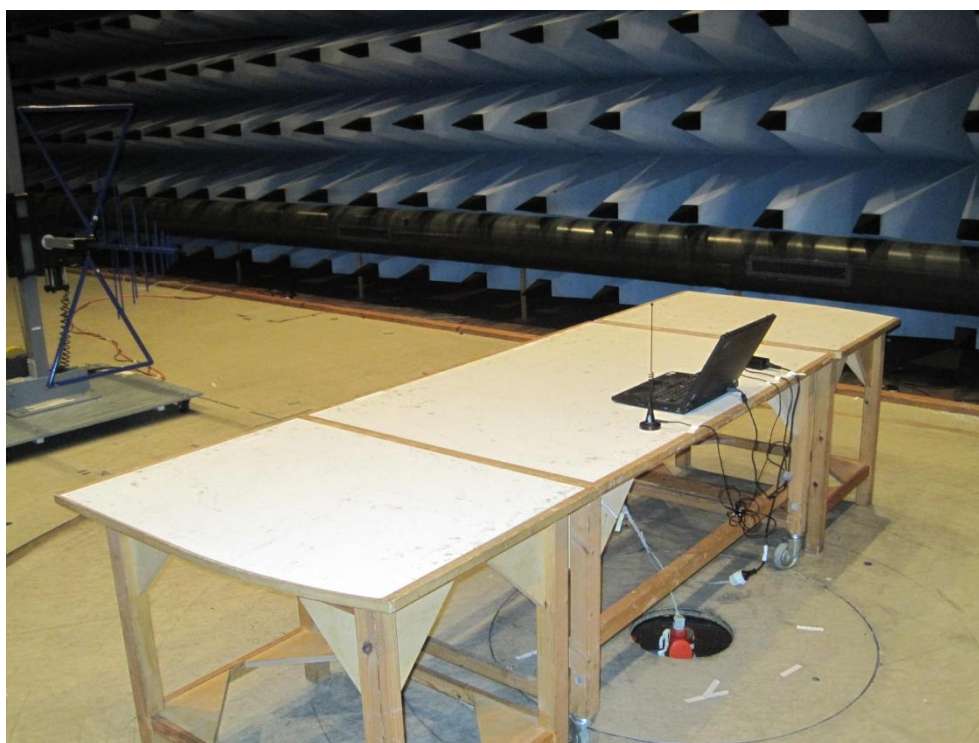


Photo 4.5.2 Test setup regarding measurement radiated limits below 1 GHz.



4.6 Test ID 2.5b: Radiated limits above 1 GHz

Test objects and Aux. equipment	Combination of 2.1.1: USB Meter Reader 2.1.2: Roof antenna 2.2.1: IBM PC Thinkpad T61 2.2.2: AC/DC Power supply for IBM PC	Sheet	RE_Spur-4
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	04 Sep 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	1-12.75 GHz

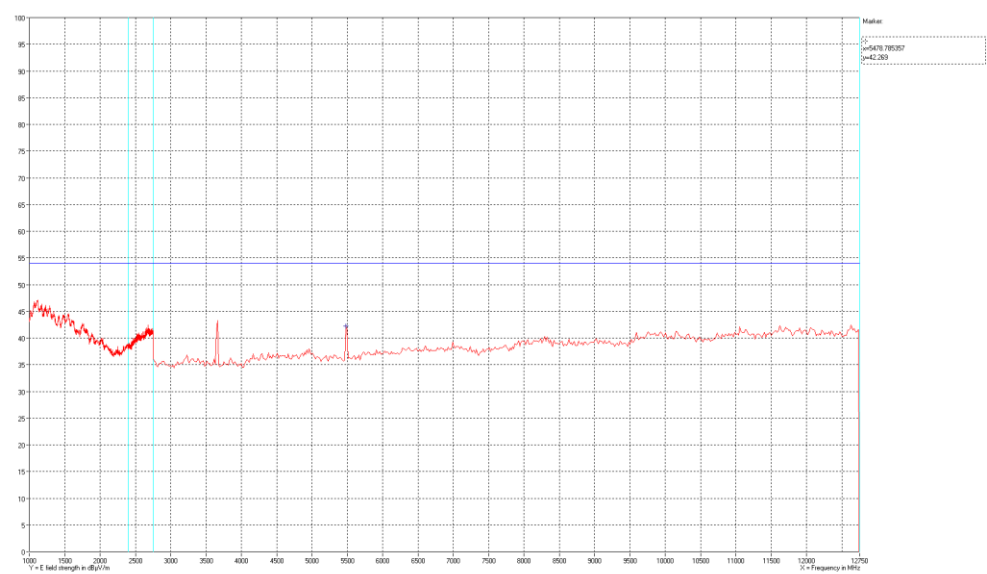
Test method	ANSI C63.10:2009	Temperature	23 °C
Characteristics	Complete search, antenna distance 3 m	Humidity	41 % RH
Detector	Peak	Bandwidth	1 MHz
Test equipm.	EMI room Hørsholm 49600 49712 49625	Uncertainty	4.9 dB

Final max (Peak) :

Frequency MHz	Level dBµV/m	Peak Limit dBµV/m	AV Limit dBµV/m	Margin to AV dB	Polarisation
3665.00000	43.3	74.0	54.0	9.7	Complete search
5478.80000	42.3	74.0	54.0	11.7	Complete search

Test result	The measured field strengths were below the limit
Test Port	Enclosure
Test frequency	Tx @ 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	Prescan and final maximal measurements by variation of turntable azimuth, antenna height and antenna polarization





Polarization	Vertical and horizontal peak measurements
Comments	All measurements were performed with a peak detector. All peak measurements were below average limit.



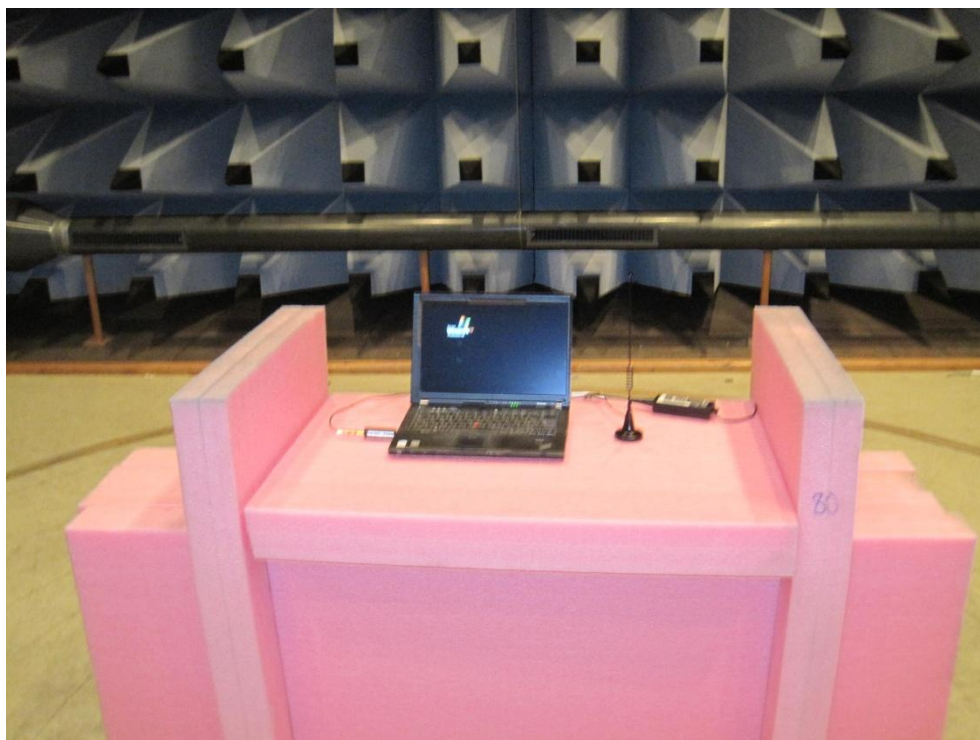


Photo 4.6.1 Test setup regarding measurement radiated limits above 1 GHz.



Photo 4.6.2 Test setup regarding measurement radiated limits above 1 GHz.

4.7 Test ID 2.6: Antenna conducted emission

Test object	USB Meter Reader	Sheet	RE_Con-1
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	02 Oct 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916 MHz

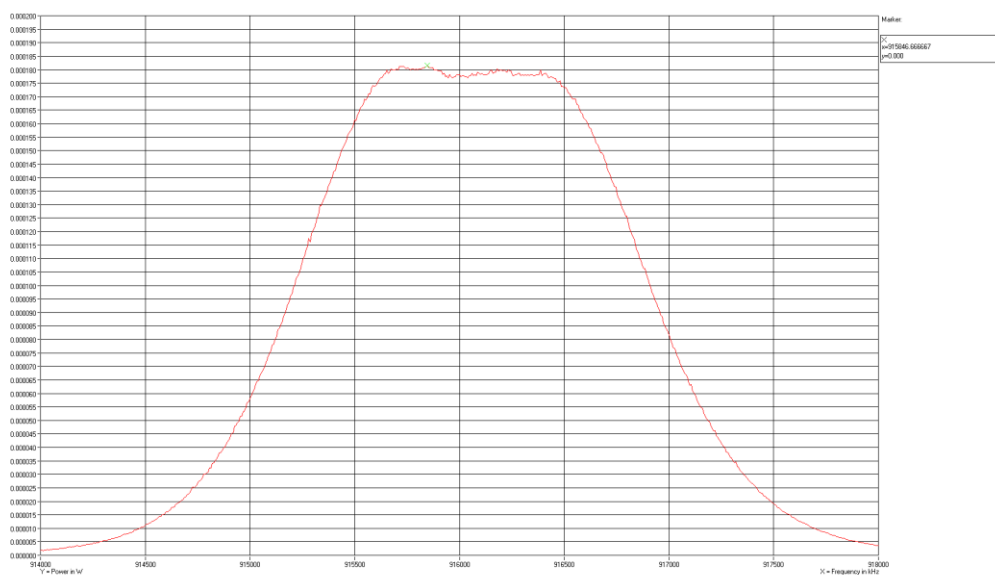
Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Conducted measurement @ antenna port	Humidity	42 % RH
Span	3 MHz	RBW	1 MHz
Sweep	Auto	VBW	3 MHz
Detector	Peak	Trace	Max hold
Test equipm.	Outside EMC room Hørsholm 49184 49550 49299	Uncertainty	1.1 dB

Final max (Peak) :

Frequency MHz	Level dBm	Level mW	Limit dBm @ 3m	Limit mW	Margin dB	(Max ant gain) (dBi)
915.84666	-7.41	0.18	30.00	1000.0	37.41	(5.15)

Test result	The measured power was below the limit
Test Port	Antenna connector
Test frequency	915.85 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The limit of 1000.0 mW applies to transmitters with antenna gain up to 6 dBi. The test object incorporates an external antenna with a maximum gain of 5.15 dBi. Measurements are corrected for cable losses.





Polarization

Not applicable

Comments

Conducted measurement of antenna emission

4.8 Test ID 2.3: 6 dB bandwidth

Test object	USB Meter Reader	Sheet	RE_Con-2
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	02 Oct 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916 MHz

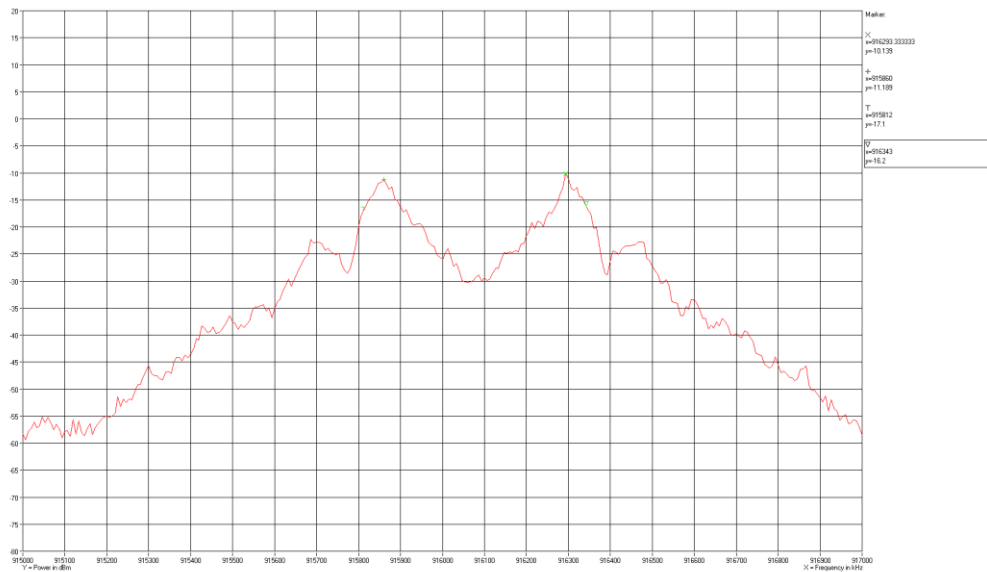
Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Conducted measurement @ antenna port	Humidity	42 % RH
Span	2 MHz	RBW	10 kHz
Sweep	Auto	VBW	30 kHz
Detector	Peak	Trace	Max hold
Test equipm.	Outside EMC room Hørsholm 49184 49550 49299	Uncertainty	1.1 dB

Final max (Peak) :

Frequency Peak 1 MHz	Frequency 6 dB Delta 1 MHz	Frequency Peak 2 MHz	Frequency 6 dB Delta 2 MHz	6 dB BW Delta 2 - Delta 1 MHz
915.860	915.812	916.293	916.343	000.531

Test result	The measured bandwidth is within the limit
Test Port	Antenna connector
Test frequency	Fundamental frequency is set at 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The 6 dB BW lower limit was 500 kHz. The test object has a 6 dB BW of 531 kHz. Measurements are corrected for cable losses.





Polarization	Not applicable
Comments	Conducted measurement of 6 dB BW



4.9 Test ID 2.7: Occupied bandwidth & band edge compliance

Test object	USB Meter Reader	Sheet	RE_Con-3
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	02 Oct 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916 MHz

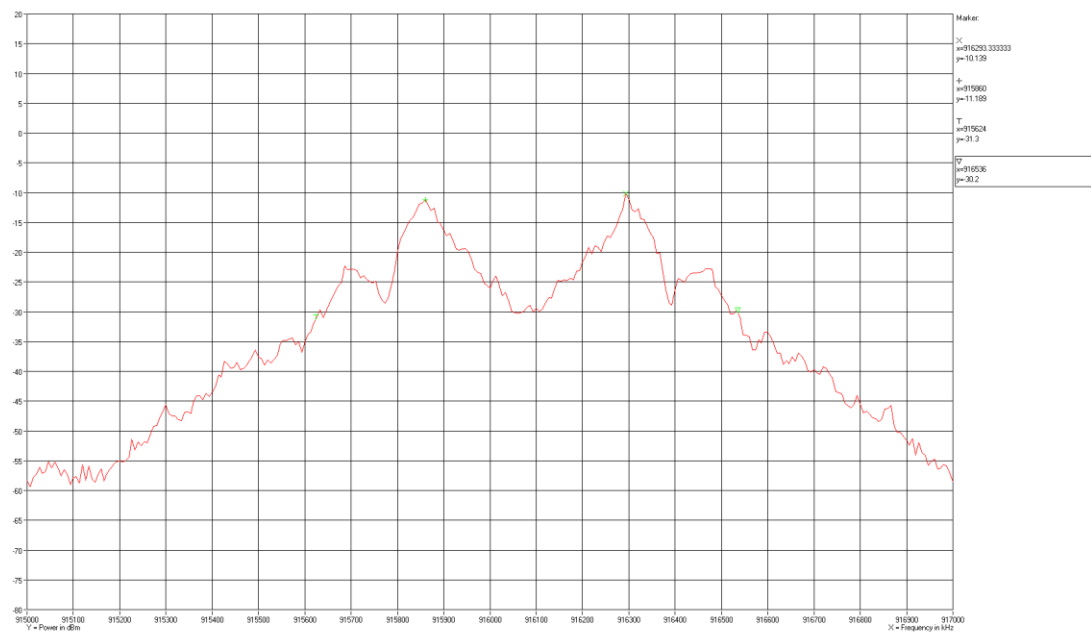
Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Conducted measurement @ antenna port	Humidity	42 % RH
Span	3 MHz	RBW	10 kHz
Sweep	Auto	VBW	30 kHz
Detector	Peak	Trace	Max hold
Test equipm.	Outside EMC room Hørsholm 49184 49550 49299	Uncertainty	1.1 dB

Final max (Peak):

Frequency Peak 1 MHz	Frequency 20 dB Delta 1 MHz	Frequency Peak 2 MHz	Frequency 20 dB Delta 2 MHz	20 dB OBW Delta 2 - Delta 1 MHz
915.860	915.624	916.293	916.536	000.912
Band Edge MHz	20 dB OBW frequency MHz	Margin MHz		
902.000	915.624	13.624		
928.000	916.536	11.464		

Test result	The measured occupied bandwidth was within the limit. Band edges are respected.
Test Port	Antenna connector
Test frequency	Fundamental frequency was set at 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The measured 20 dB OBW was 912 kHz. The 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated (15.247).





Polarization	Not applicable
Comments	Conducted measurement of 20 dB Occupied BW



4.10 Test ID 2.8: Power Spectral Density

Test object	USB Meter Reader	Sheet	RE_Con-4
Type	See section 2	Project no.	T203210-3
Serial no.	See section 2	Date	02 Oct 2012
Client	Kamstrup A/S	Initials	CMT
Specification	See Section 1, Summary of tests	Frequency	916 MHz

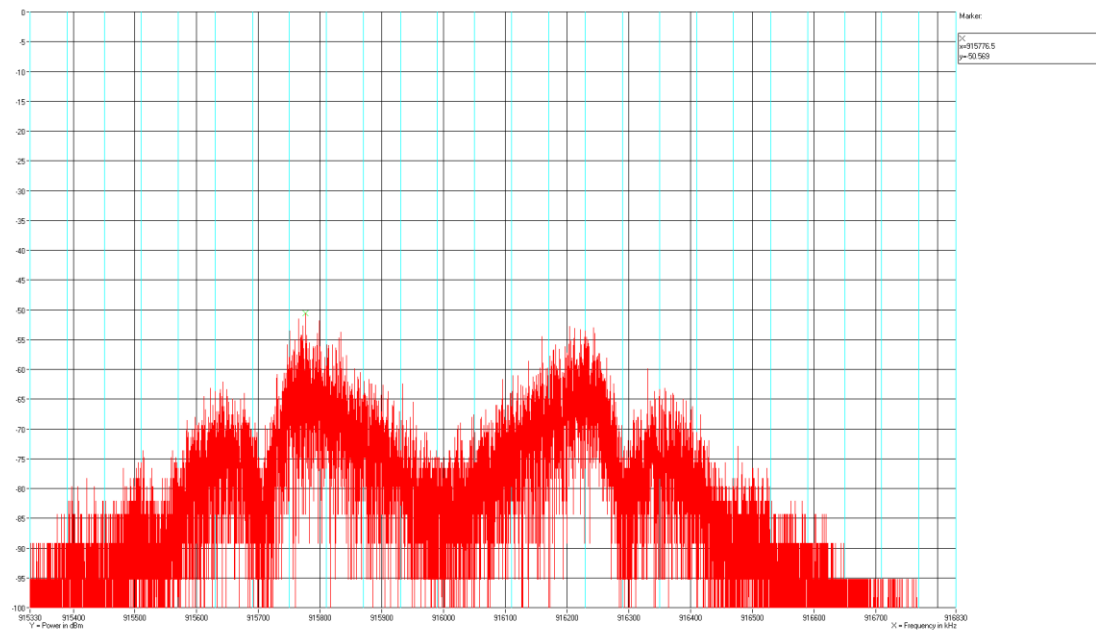
Test method	ANSI C63.10:2009	Temperature	21 °C
Characteristics	Conducted measurement @ antenna port	Humidity	42 % RH
Span	1.5 MHz	RBW	3 kHz
Sweep	Auto	VBW	10 kHz
Detector	Peak	Trace	Max hold
Test equipm.	Outside EMC room Hørsholm 49184 49550 49299	Uncertainty	1.1 dB

Final max (Peak):
 Max peak value in any 3 kHz band

Frequency MHz	Level dBm	Limit dBm	Margin dB
915.777	-50.57	8.00	58.57

Test result	The measured power spectral density was within the limit
Test Port	Antenna connector
Test frequency	Fundamental frequency is set at 916 MHz
Test mode	Continuous Tx - normal modulation
Condition	Normal
Compliant	Yes
Comments	The maximum output power was -50.57 dBm within any 3 kHz band. Measurements are corrected for cable losses.





Polarization	Not applicable
Comments	Conducted measurement of power spectral density



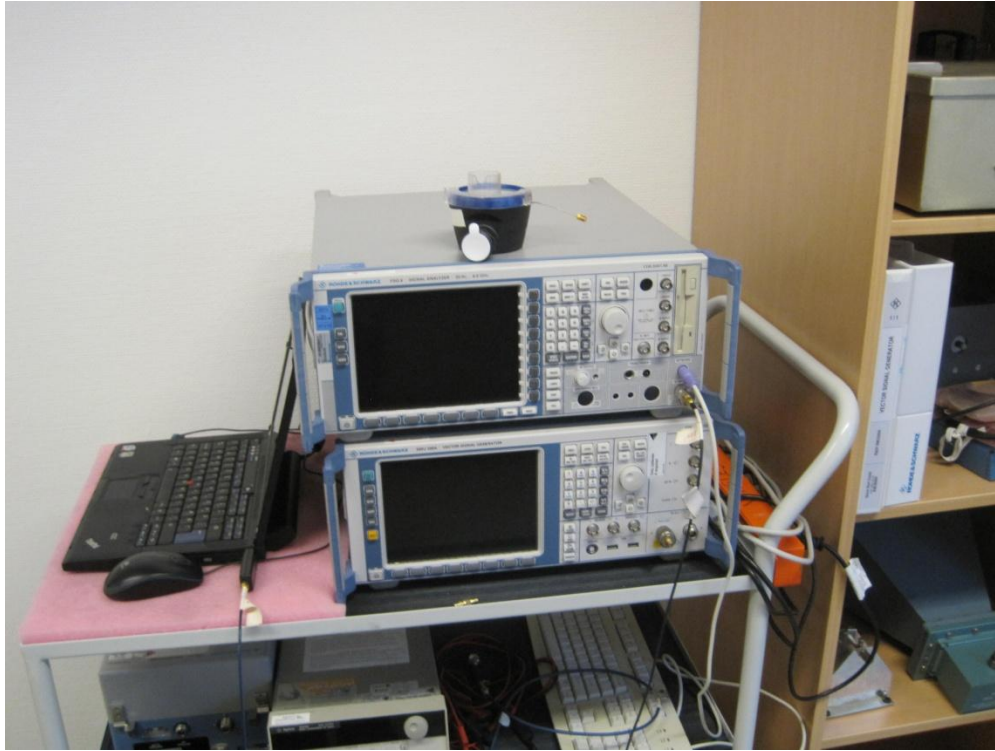


Photo 4.10.1 Test setup for all conducted measurements:
Antenna conducted emission
6 dB bandwidth
Occupied bandwidth & band edge compliance
Power spectral density

5. National registrations and accreditations

5.1 DANAK Accreditation

Organization: Danish Accreditation and Metrology Fund - DANAK, see www.danak.dk and www.ilac.org

Registration Number: 19

Area Number: C

DANAK is part of ILAC (International Laboratory Accreditation Cooperation) including its MRA (Mutual Recognition Arrangement). The MRA includes the Australian NATA and Canadian SCC.

CISPR 22 is equivalent to AS/NZS CISPR 22, and therefore this report can be used for applying the **Australian C-Tick mark** for IT equipment, when this test has been passed.

CISPR 22:2002 is equivalent to ICES-003:2004, and therefore this report can be used for approval in Canada for IT equipment, when this test has been passed.

5.2 FCC Registrations

Organization: Federal Communications Commission, USA

Registration Number: 90529

Facilities: EMC room 2 Hørsholm (EMC-2)
EMC room 3 Hørsholm (EMC-3)
EMC room 4 Hørsholm (EMC-4)
EMI room Hørsholm (EMC-5)

5.3 VCCI Registrations

Organization: Voluntary Control Council for Interference by Information Technology, Japan

Member Number: 910

Facilities: EMC room 2 Hørsholm (EMC-2): C-707, T-246 and T-1547
EMC room 3 Hørsholm (EMC-3): C-2532, T-247 and T-1548
EMC room 4 Hørsholm (EMC-4): C-2533, T-248 and T1549
EMI room Hørsholm (EMC-5): R-1180, C-706 and
T-1550, G-470

5.4 IC Registrations

Organization: Industry Canada, Certification and Engineering Bureau

Registration Number: IC4187A-5

Facilities: EMI room Hørsholm (EMC-5)



6. List of instruments

No.	Description	Manufacturer	Type No.	Cal date	Cal exp
29301	ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH2-Z5	2011-12-21	2012-12-21
29861	EMI-SOFTWARE VER. 1.60	ROHDE & SCHWARZ	ES-K1, PART: 1026.6790.02	-	-
49086	REMI EMISSION SOFTWARE PACKAGE v. 2.133, ROOM 5	NeWeTec	REMI	-	-
49421	IMPULSE VOLTAGE LIMITER (BNC)	ROHDE & SCHWARZ	ESH3/Z2	2012-06-21	2013-06-21
49550	SIGNAL ANALYZER	ROHDE & SCHWARZ	FSQ8	2012-02-28	2013-02-28
49600	SPECTRUM ANALYZER / MEASUREMENT RECEIVER	ROHDE & SCHWARZ	ESU40	2011-12-16	2012-12-16
49624	DUAL RIDGE HORN ANTENNA – 1 GHz – 26 GHz (2 GHz – 32 GHz)	SATIMO	SH2000	2011-09-19	2014-09-19
49625	SRD COAX SWITCH MATRIX USED IN 1GHZ TO 26 GHz SRD ANTENNASYSTEM	DELTA	COAX SWITCH MATRIX	2012-05-11	2013-05-11

